QUICK TAKES

New tools and updates from NCRR resources

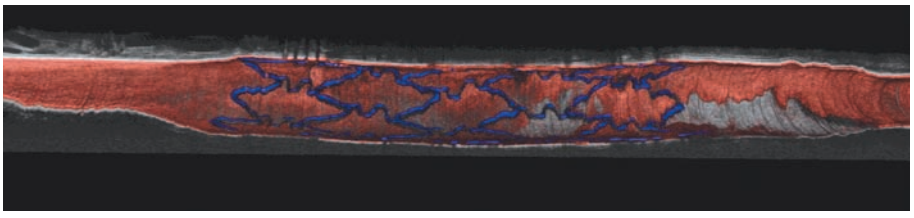
Virtual Biopsies

A new imaging technique provides inner 3-D views of porcine blood vessels in vivo, according to a report in the December 2006 issue of *Nature Medicine*. Researchers used a minimally-invasive catheter to deliver a tiny imaging probe to pigs' arteries, obtaining microscopic images. The same technique could help physicians inspect coronary arteries for high-risk plaques or damaged tissue.

The imaging probe, measuring less than 1 mm in diameter, works by rotating an optical fiber that is shaped to focus and direct infrared light into the vessel wall. The researchers measured the back-scattered light collected by the probe and then used computations to create longitudinal or cross-sectional views of the vessels.

The technique was developed at the Wellman Center for Photomedicine at the Massachusetts General Hospital in part through NCRR funding. This type of 3-D microscopy could bridge the gap between low-resolution radiological techniques and excisional biopsies. Unlike other existing high-resolution microscopy techniques, images can be obtained in a matter of seconds.

The technique, named optical frequency-domain imaging, can also be used to examine the gastrointestinal tract or detect early cancerous lesions.



■ A 3-D image of a porcine artery and stent (in blue) is created using a new type of laser microscopy.

■ Scientists have uncovered the purple sea urchin's 23,300 genes.

Sea Urchin Genome

The sea urchin is a favorite animal model among developmental biologists, just like the fruit fly and the worm. But it has one advantage over its fellow invertebrates: its genome is closer to that of humans on the evolutionary scale, according to a study published in the November 10, 2006 issue of *Science*. The study describes, for the first time, the sequence and analysis of the 814 million DNA bases that make up the genome of the purple sea urchin *Strongylocentrotus purpuratus*.

The scientists used a two-pronged strategy to sequence the urchin genome: whole-genome shotgun sequencing and a library of bacterial artificial chromosomes (BAC), clones that carry inside them very large pieces of sea urchin DNA. The NCRR-funded Sea Urchin Genome Resource at the California Institute of Technology provided the BAC library and the DNA for shotgun sequencing.

The sea urchin genome spells out about 23,300 genes. Surprisingly, genes previously thought to be unique to vertebrates also were found in the sea urchin. This realization will allow scientists to perform functional studies in a simple animal model that shared a common ancestor with vertebrates long ago.

Stem Cells Increase Insulin

Researchers at the NCRR-funded Adult Mesenchymal Cell Resource at the Center for Gene Therapy in Tulane University have successfully used adult human stem cells to increase insulin production in a mouse model of diabetes. The work was published in the November 14, 2006 issue of the *Proceedings of the National Academy of Sciences*.

In type 2 diabetes, the pancreas cannot make enough insulin to help process blood glucose into energy. In this study, the researchers injected human multipotent stromal cells (hMSCs)—cells that have the potential to become different types of cells in the body—derived from human bone marrow into the left cardiac ventricles of immunodeficient mice. The human cells did not appear to differentiate into insulin-producing cells. Rather, the hMSCs migrated to the pancreas and seemed to induce the development of endogenous mouse cells that produce insulin. The levels of insulin in the treated mice were found to be twice that of control diabetic mice.

Scientists believe these versatile hMSCs could be used in the future for treating high blood glucose in diabetic human patients. The cells can be obtained from a patient's bone marrow and grown in culture for later transplant back into the patient. ■

PHOTO BY CHARLES HOLLAHAN(TOP), PHOTO COURTESY OF WELLMAN CENTER FOR PHOTOMEDICINE, MASSACHUSETTS GENERAL HOSPITAL (BOTTOM)